

Orbigator Electronics Specification (v1.5)

This version (v1.5) updates the Orbigator electronics specification with the finalized pin map, clean Block Diagram (Table Style), and alignment with the current hardware prototype.

I²C Bus and User Interface

Signal	Function	Pico GPIO
I2C0_SDA	OLED + DS3231 RTC data	GP4
I2C0_SCL	OLED + DS3231 RTC clock	GP5

Signal	Function	Pico GPIO
ENC_A	Encoder A phase	GP16
ENC_B	Encoder B phase	GP17
ENC_PUSH	Encoder push button	GP18

ULN2003 Stepper Drivers (28BYJ■48 Motors)

ULN2003 #1 – AOV Stepper:

Net	Function	Pico GPIO
AOV_IN1	ULN2003 #1 coil 1	GP8
AOV_IN2	ULN2003 #1 coil 2	GP9
AOV_IN3	ULN2003 #1 coil 3	GP10
AOV_IN4	ULN2003 #1 coil 4	GP11

ULN2003 #2 – Spare Stepper:

Net	Function	Pico GPIO
ULN2_IN1	ULN2003 #2 coil 1	GP19
ULN2_IN2	ULN2003 #2 coil 2	GP20
ULN2_IN3	ULN2003 #2 coil 3	GP21
ULN2_IN4	ULN2003 #2 coil 4	GP22

Pololu■Style STEP/DIR Drivers (Bipolar Steppers)

Pololu #1 – LAN Stepper:

Net	Function	Pico GPIO
LAN_STEP	Pololu #1 STEP	GP14
LAN_DIR	Pololu #1 DIR	GP15

LAN_M0	Microstep M0	GP2
LAN_M1	Microstep M1	GP3
POLOLU_EN	Shared EN/SLEEP	GP13

Pololu #2 – Spare Bipolar Stepper:

Net	Function	Pico GPIO
M2_STEP	Pololu #2 STEP	GP0
M2_DIR	Pololu #2 DIR	GP1
M2_M0	Microstep M0	GP6
M2_M1	Microstep M1	GP7
POLOLU_EN	Shared EN/SLEEP	GP13

High■Level Block Diagram (Table Style)

Pico Pin	Signal Name	Peripheral
GP4	SDA	OLED + RTC (I ² C bus)
GP5	SCL	OLED + RTC (I ² C bus)
GP16	ENC_A	Rotary Encoder A
GP17	ENC_B	Rotary Encoder B
GP18	ENC_PUSH	Encoder Switch
GP8–11	AOV_IN1–4	ULN2003 #1 (AOV stepper)
GP19–22	ULN2_IN1–4	ULN2003 #2 (spare stepper)
GP14	LAN_STEP	Pololu #1 STEP
GP15	LAN_DIR	Pololu #1 DIR
GP2, GP3	LAN_M0, LAN_M1	Pololu #1 microstep pins
GP0, GP1	M2_STEP, M2_DIR	Pololu #2 STEP/DIR
GP6, GP7	M2_M0, M2_M1	Pololu #2 microstep pins
GP13	POLOLU_EN	Shared EN/SLEEP for Pololu drivers

Notes

- All Pololu EN/SLEEP lines are tied together on GP13 for simplicity.
- OLED and DS3231 share I²C0 on GP4/GP5.
- Encoder pins GP16/17/18 match hardware prototype.
- ULN2003 #1 drives AOV motor; ULN2003 #2 reserved for expansion.
- Pololu #1 drives the LAN stepper; Pololu #2 reserved for future expansions.